

**REMARKS**

**Summary of the Office Action**

The disclosure stands objected to because of informalities.

FIG. 3 stands objected to because references 15 and 16 should be exchanged for proper reference.

Claims 4, 7, and 13 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,982,629 to *Shoji et al.* ("*Shoji*").

Claim 11 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over *Shoji* in view of U.S. Patent No. 6,297,142 to *Mita et al.* ("*Mita*").

**Summary of the Response to the Office Action**

Applicants have amended claims 4, 7, and 13 and added new claims 14-20 to further define the invention. No new matter has been added. Applicants submit concurrently herewith a Submission of Replacement Drawing. Accordingly, claims 4, 7, 11, 13, and 14-20 are presently pending.

**The Objection to the Disclosure**

The disclosure stands objected to because of informalities. Applicants have amended the paragraph on page 10, line 6 in accordance with comments of the Examiner. Accordingly, Applicants respectfully request that the objection to the specification be withdrawn.

**The Objection to the Drawing**

FIG. 3 stands objected to because references 15 and 16 should be exchanged for proper reference. Applicants have amended FIG. 3 in accordance with the comments of the Examiner. Accordingly, Applicants respectfully request that the objection the drawings be withdrawn.

**The Rejection Under 35 U.S.C. § 103(a)**

Claims 4, 7, and 13 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,982,629 to *Shoji et al.* ("*Shoji*"). Applicants respectfully traverse the rejection for at least the following reasons.

The Office Action has not established a *prima facie* case of obviousness at least because *Shoji*, whether alone or in combination, fails to teach or suggest all the recited features of amended independent claims 4 and 13. Independent claims 4 and 13 recite, in part, "an insulating layer whose thickness is smaller than that of the terminal portion . . . is formed so as to cover a peripheral edge of the second plated layer by climbing up on the plated layer." Amended claims 4 and 13 clearly recite the thickness of the insulating layer is smaller than that of the terminal portion. Thus, *Shoji* fails to teach or suggest at least these features of claims 4 and 13.

The object of the present invention is to prevent corrosion of the peripheral edge of the plated layer caused when the peripheral edge of the plated layer is peeled off due to the thermal expansion of the terminal portion having a considerable thickness. In order to achieve this object, amended claims 4 and 13 recite "the insulating layer is made of epoxy resin." The epoxy resin having a good coating property is necessarily required to achieve the configuration that the

insulating layer covers the peripheral edge of the second plated layer by climbing up on the plated layer.

But *Shoji* discloses only a technique for forming solder bumps on electrodes without using wire bonding techniques. This disclosure differs from the present invention in terms of the object and technical field. Moreover, in *Shoji*, the thickness of the terminal portion is about 5 $\mu$ m and is smaller than the insulating layer, in contrast to the present invention. Accordingly, *Shoji* fails to disclose “an insulating layer whose thickness is smaller than that of the terminal portion . . . is formed so as to cover a peripheral edge of the second plated layer by climbing up on the plated layer,” as recited in amended independent claims 4 and 13. Further, the semiconductor device of *Shoji* does not require such a configuration. Note that, in *Shoji*, the insulating layer is made of SiO<sub>2</sub> and its property is clearly different from epoxy resin.

The pending claims 4 and 13 recite “the circuit board is a square-shaped rigid-type printed wiring board made of glass epoxy resin.” Since *Shoji* only discloses that solder bumps are formed on the electrodes in the semiconductor substrate, it may not be assumed that the substrate is made of glass epoxy resin.

Generally, in cited references that disclose the configuration in which solder bumps are formed on electrodes, the object and technical field thereof is different from those of the present invention, and also the size of the respective elements is different from the size of the respective elements recited in the claimed invention. For example, according to the present invention, the thickness of the base layer of copper is about 35 $\mu$ m, the thickness of the plated layer of nickel is

4 $\mu$ m or more, the thickness of the plated layer of gold is about 1.5 $\mu$ m, and the thickness of the insulating layer made of epoxy resin is about 7 $\mu$ m. Meanwhile, according to *Shoji*, the thickness of the base layer of copper is 1 $\mu$ m, the thickness of the plated layer of nickel is 3 $\mu$ m, and the thickness of the plated layer of gold is about 1 $\mu$ m (although not explicitly shown). Also, in *Shoji*, the thickness of the insulating layer (SiO<sub>2</sub>) is 10 $\mu$ m. Accordingly, it can be understood that the thickness of the terminal portion (Cu layer + Ni layer + Au layer) of the present invention is much larger than the 5 $\mu$ m in *Shoji*. Also, in *Shoji*, the thickness of the insulating layer is larger than that of the terminal portion, in contrast to the present invention.

In the present invention, the terminal portion is formed to have a relatively large thickness, in order to ensure the durability and abrasion that is required for the electrodes of the battery pack and to address the linear expansion of the terminal portion. These technical features are addressed in amended independent claims 4 and 13.

On the other hand, in *Shoji*, since metal material whose linear expansion coefficient is close to Si (e.g., Al alloy) is used as the electrode material, other metal alloy layers can be formed to have a relatively small thickness by the sputter technique. Thus, originally, the problem caused by the linear expansion coefficient is not present in *Shoji*.

In view of the above, the present invention is directed to a terminal portion for connecting the battery to other electrical circuits, and therefore is different from *Shoji* which is directed to forming solder bumps on electrodes in terms of the technical content as well as the technical field.

As pointed out in M.P.E.P. § 2143.03, all the claimed limitations must be taught or suggested by the prior art to establish *prima facie* obviousness of a claimed invention. Because *Shoji*, fails to teach or suggest each feature of amended independent claims 4 and 13, the rejections under 35 U.S.C. § 103(a) should be withdrawn.

Claim 7 depends from independent claim 4. Accordingly, claim 7 is also allowable because of the additional features it recites and the reasons stated above. In view of the above, the present invention is patentable over the combination of *Shoji* and knowledge of one of ordinary skill in the art at the time the invention was made.

Claim 11 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over *Shoji* in view of *Mita*.

As demonstrated above, *Shoji* does not disclose the above-mentioned features. *Mita* is only relied upon for a teaching of a method of forming a semi-conductor by stamping. Thus, *Mita* does not make up for the deficiencies above-mentioned with *Shoji*.

Accordingly, *Shoji* in view of *Mita* fails to teach or suggest each and every feature of claim 4 and its dependent claim 11. Thus, the rejection of claim 11 should be withdrawn.

### **New Claims**

Applicants respectfully request allowance of dependent claims 14-19, which depend from newly amended independent claim 4. The claims are allowable insofar as they recite the patentable combinations of features recited in their base claim, as well as reciting additional features that further distinguished over the applied prior art. Claim 20 is allowable for at least

some of the same reasons demonstrated above.

Accordingly, in view of the above amendments, claims 14-20 are allowable and pending for further consideration.

**Conclusion**

In view of the foregoing, Applicant respectfully requests reconsideration and the timely allowance of the pending claims. Should the Examiner feel that there are any issues outstanding after consideration of this response, the Examiner is invited to contact Applicant's undersigned representative to expedite prosecution.

If there are any other fees due in connection with the filing of this response, please charge the fees to our Deposit Account No. 50-0310. If a fee is required for an extension of time under 37 C.F.R. § 1.136 not accounted for above, such an extension is requested and the fee should also be charged to our Deposit Account.

Respectfully submitted,

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